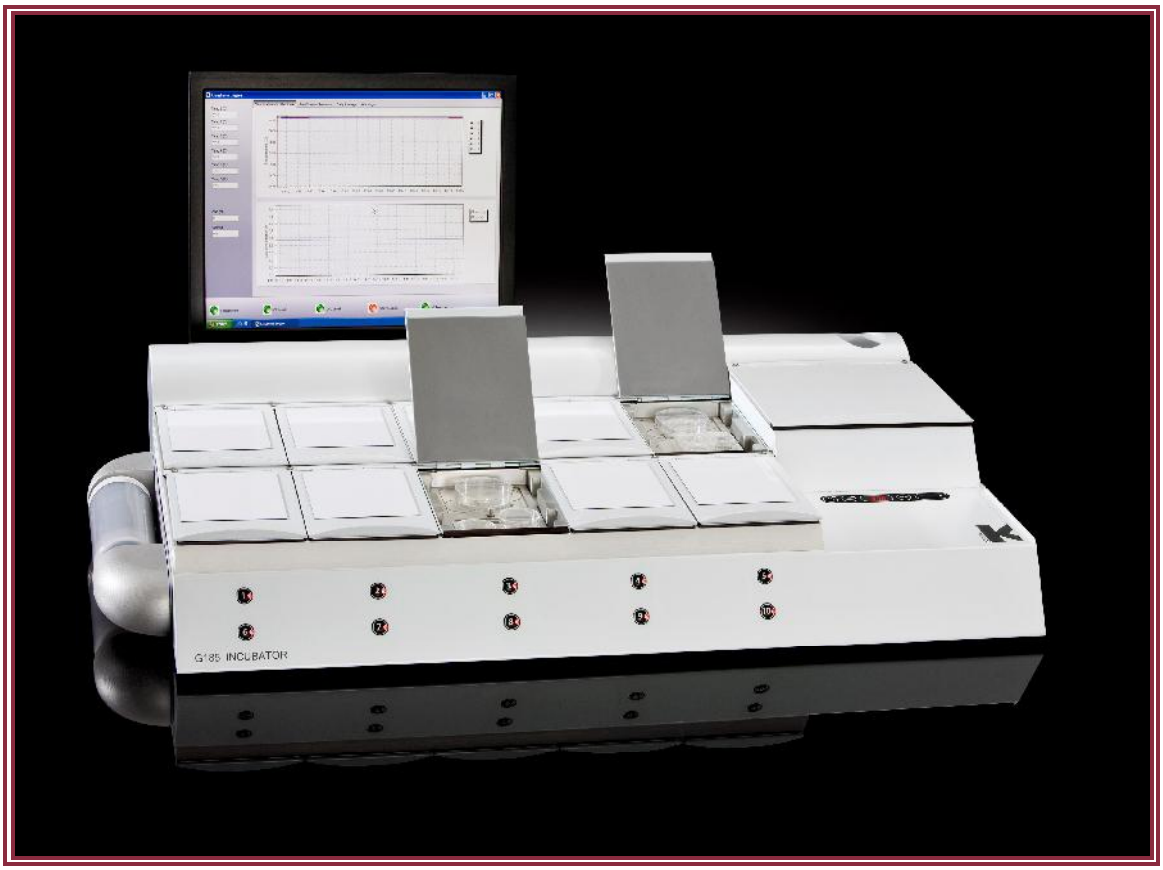

K-SYSTEMS

User Manual

CO2 / O2 Long Term Incubator G185

Version 1.6

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1 General Information & Service

COPYRIGHT

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Users of K-SYSTEMS Kivex Biotec products should not hesitate to contact us if there are any unclear points or ambiguities in this manual.

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CAUTION: If the equipment is used in a manner not specified by this manual, the safety of the user may be at risk and the equipment may be damaged. Always use the equipment as outlined in this instruction manual.

2 Explanation of Symbols Used in Manual

NOTE

Used to direct attention to a specific item.

WARNING

Used to warn the user against a specific item.

DANGER

Used when caution is needed.

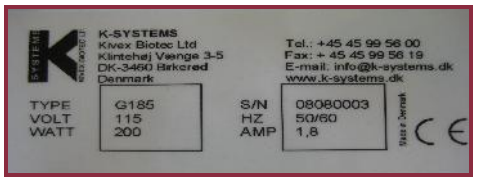
HELP

Used when the help of an assistant is needed.

3 Safety symbols

The G185 contains high voltage components that may be hazardous. Therefore it is strongly recommended that in order to reduce the risk of electric shock, the button cover not to be removed.
This equipment doesn't contain any serviceable parts. It is therefore recommended to have qualified service personnel performing any service needed on the equipment.

There are several types of labels attached to a G185. A complete list of labels are shown on table below.

This device contains UV light with a wave length of $254nm$. Always power off by removing mains power cord from socket before removing cover. ⚠ **Exposure to UV radiation may cause serious damages to your skin and eyes.**	
Warning on the back of incubator indicates that an earth connection is needed.	
This 'bolt of lightning' indicates un-insulated materials within your unit may cause an electrical shock. For the safety of everyone in the laboratory please don't remove any covering.	
Warning label on mains wire.	
Main product label.	

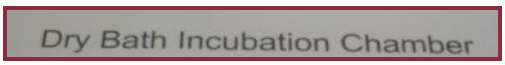
Warning for 110/115V countries.	
Warranty label – Warning.	
The symbol indicates that the unit contains high sensitive electronic components which can be damaged by static electricity.	
Internal label placed next to every earth wire.	
K-SYSTEMS brand logo.	

Info labels on the back of the G185

☛ *<u>Always</u> have red cap on un-used gas input and outputs.*

Chamber numbers on the front of the incubator, can be seen in the left corner of each chamber.

Label on the large heating compartment.



☛ *Please note that there is no gas control in the large compartment.*

The large compartment is not intended for any long term incubation purposes.

4 Precautions/warnings

- Do not use product if package is damaged.
- Do not use product without a proper VOC filter attached.
- Do not use this product at temperatures exceeding 30^{o}C.
- Do not block the cooling fan while in operation.
- Never use a non-K-SYSTEMS filter.
- Use only 100% pure CO2 and 100% pure N2 gas.
- Always use HEPA filter for input CO2 and N2 gas.
- Always keep red cap on unused gas and sample lines.
- Read and understand the user manual completely before use.
- NEVER block gas supply pins placed in the middle of each of the 10 gas chambers.
- Make sure that CO2 and N2 gas supply pressures are kept stable at 1.0 bar.
- Always connect power cord to a proper grounded outlet.
- VOC filters must be changed in the interval described in the manuals.
- UV lamp must be changed in the interval described in the manuals.
- O2 sensor must be changed in the interval described in the manuals.
- Big compartment only to be used to keep things warmed.
- Never leave lids open for more than 10 seconds.
- Perform temperature and gas calibration in the intervals described in the manuals.
- To reduce the risk of fire or electric shock, this equipment should not be exposed to rain or moistures and objects filled with liquids.

5 Important Safety Instructions

- Read the safety instructions before using equipment.
- Always keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Do not block any ventilation openings.
- Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus that produce heat.
- Do not defeat the safety purpose of the grounding-type plug.
  A grounding type plug has two blades and a third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from apparatus.
- Unplug this apparatus during lightning, storms or when unused for a long period of time.
- Refer all servicing to qualified service personnel.
  Servicing is required according to service manual or if the apparatus has been damaged in any way, such as if the apparatus have been dropped, exposed to rain or moisture, or does not operate normally.

6 General description

This unit does not contain any user serviceable parts. Please leave all maintenance work to qualified personnel.

6.1 Setup precautions

In order to avoid any possible damages' to this system please follow all setup precautions described in this chapter.

Finding a suitable location
Place this unit on a flat, hard and stable surface. Never place the unit on a carpet or similar surfaces.

Never place this unit on top of other equipment that might heat it up.

Space for ventilation
Never put anything under this unit, this might block the ventilation openings causing possible damage to system.

Place this unit in a location with adequate ventilation to prevent internal heat build up. Allow at least 10 cm clearance from the rear, 30 cm from the top and 20 cm from left and right to prevent overheating.

Avoid high temperature, moisture, water and dust
This unit must not be exposed to dripping or splashing.
This unit is intended for indoor purposes only.

6.2 Accessories supplied

- 3 VOC filter capsules (plus one installed).
- 2 HEPA filter for input gas supply.
- 10 warming blocks for Nunc® OR Falcon®.
- 10 magnet pads to be attached to lids for writing & Pack of Pens
- 1 CD-ROM containing K-SYSTEMS A/S data logging software
- 1 Data Extension Cord & 1 USB Converter
- 2 Silicone Tube Sealing Rings & Silicone Tube (3 m)
- Test Lid
- 1 CD-ROM containing USB converter drivers

6.3 Copyright notice

The making of any unauthorized copies of copy-protected material, including manuals and software is an infringement of copy rights and constitute a criminal offence.

7 Product descriptions

The G185 incubator is a new generation of desktop CO2 and O2 incubator used for maintaining an optimal environment for the development of embryos and blastocysts.

Direct warming of the dishes in the chambers gives superior temperature conditions in comparison to conventional incubators.
The G185 incubator is composed of 10 separate culture heat chambers each having its own lid and a flat warming block insert. The warming blocks are customized to accommodate several types of dishes for either Falcon® or Nunc®. In addition the G185 incubator has a large warmed compartment on the side that can hold culture media.

For maximum performance the system has 6 separate temperature controllers, controlling and regulating the temperature in the culture chambers and the large compartment.

The Incubator needs 100% CO2 and 100% N2 in order to be able to control the CO2 and O2 concentrations in the culture chambers.

The incubator has been developed and optimized for tissue culturing with an overlay of either Paraffin or mineral oil.

The incubator can be connected to a pc running the K-SYSTEMS data logging software for long term data logging and data storage.

Also an external dialler[1] can be connected to the incubator to ensure maximum safety and reliability.

☛ *Open culture may lead to evaporation and a change in pH.*

[1] External dialler is an option. Please contact your K-SYSTEMS sales representative in your country for more information.

8 Control panel for G185 incubator

In the below table the control panel is explained.

(Alarm button) - is used to mute an audible alarm.	
(Standby –On) - Turns on this unit or turns off to normal standby mode.	
(Display panel) - Shows information about the current status of the unit	
(Setpoint) - Is used to select item in the menu in order to change their status. It is also used to change temperature and gas setpoints.	
(Arrow keys up and down) - Are used to navigate through the menu and changes values for temperature and gas concentrations	

8.1 Compartment indicators

The compartment indicators are used to indicate whether a compartment is occupied or not.

9 Mains connection

The G185 comes with a non detachable mains power cord. The power cord is prepared for the country in which the unit is intended to be used in. Insert this in a suited mains supply that is grounded.

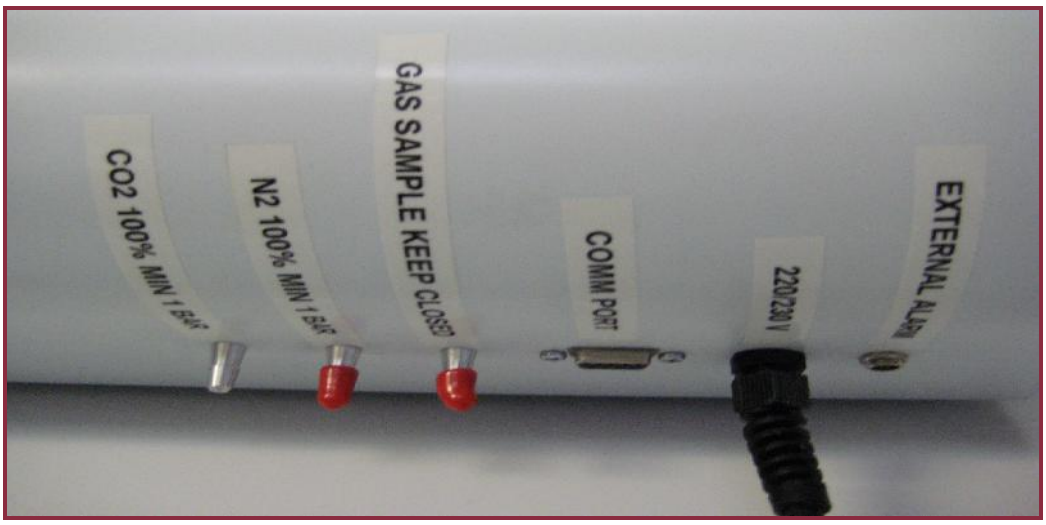
Do not defeat the safety purpose of the grounding-type plug.
A grounding type plug has two blades and a third prong is provided for <u>your</u> safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

The power requirement is: 230V 50 Hz <u>OR</u> 115V 60Hz and must be specified by customer prior to order.

Connecting the unit to a wrong voltage will cause serious damages to the system.

10 Gas connections

On the back of the unit there are two gas inlets and one gas sample port outlet. These ports are marked “CO2”, “N2” and “Gas sample port”.

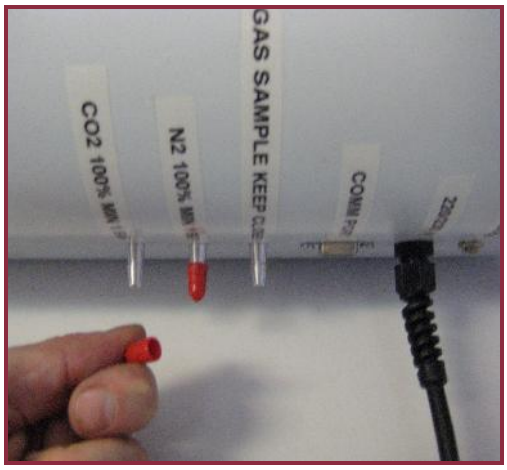


The CO2 inlet should be connected to 100% pure CO2.
The N2 inlet should be connected to 100% pure N2 if low oxygen conditions are required. O2 control in the compartments is available in the range from 20%- 2% by infusing the N2.

☛ *Gas pressure for both inlets should be 1.0 bar (14.5 PSI) and must be kept stable.*

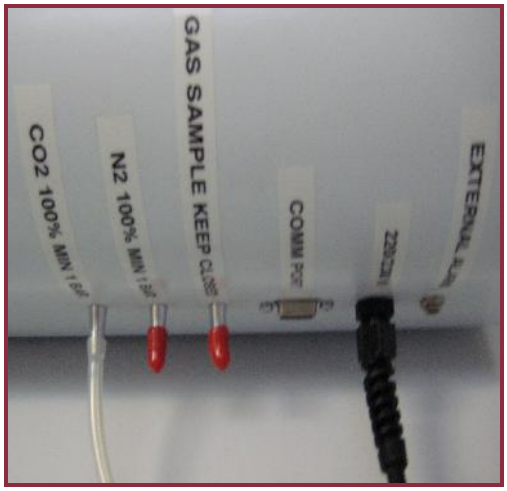
Always use a high quality pressure regulator for both gases.

Remove the red cap for the gas inlet that is needed.



☛ *Take care not to loose the cap as it will be needed when gas is not connected to the unit.*

Connect the CO2 gas to the CO2 inlet with a suitable silicone tube.



Connect the N2 inlet to the Nitrogen Bottle in a similar way.

☛ *If no Oxygen control is needed leave the red cap on the N2 inlet.*

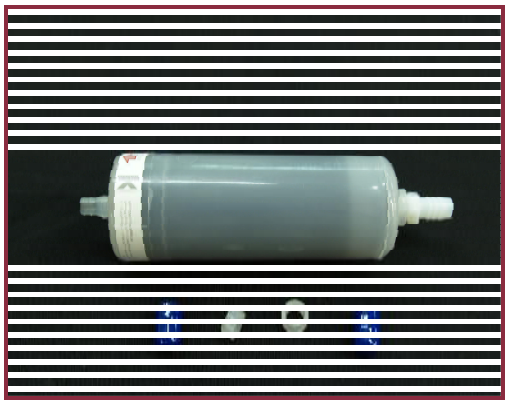
⚠ **Never run the unit with an inlet or outlet NOT covered by a red cap.**

11 HEPA / VOC filter

The combined HEPA and VOC filter is mounted on the side of the unit for easy access and replacement.

11.1 Preparation of new filter capsule

The needed parts are: The VOC filter, two pieces of silicone tube sealing rings. The two blue caps that are installed on the filter when unwrapped can be discarded.



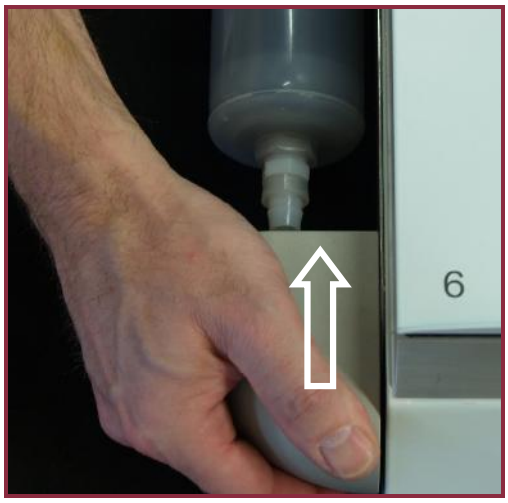
Correct filter performance is crucial for the system performance.

☛ *Filter element should be changed every 3 months. Mark the date when it is put on and make sure to keep this interval.*

Start by putting the silicone tube sealing ring on each side of the new filter element. It must be put on so that it touches the base of the filter fitting.

Press one end of the filter (remember flow direction) into the stationary side of the filter holder. It should align fully with the base of the filter holder.

Then fit the other side of the filter into the sliding part of the filter holder and slide it into place. It may be necessary to twist the filter element gently to get it to connect fully.



☛ *Notice the flow direction on the side of the filter element (indicated by an arrow on the label) MUST be the same as shown on the side of G185.*

⚠ **A filter element that has been fitted incorrectly will cause the unit not to work as intended.**

Filter correctly installed

Flow direction as marked on the G185.

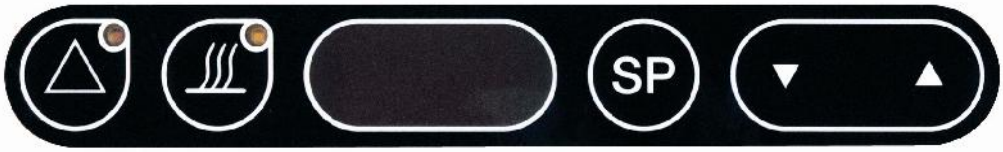
11.2 Removing old filter

The filter is removed by gently rotation the filter element with one hand and pulling back the sliding part of the filter holder.

⚠ **Never run the G185 with the filter element missing.**

12 Menu

In the next chapters the functions associated with the keyboard and the menu items explained.
The table below shows the main keys and their purposes.

<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td>(Alarm button)
- is used to mute an audible alarm.</td><td> </td></tr>
<tr><td>(Standby –On)
- Turns on this unit or turns off to normal standby mode.</td><td> </td></tr>
<tr><td>(Display panel)
- Shows information about the current status of the unit</td><td> </td></tr>
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- Is used to select item in the menu in order to change their status. It is also used to change temperature and gas setpoints.</td><td>
</td></tr>
<tr><td>(Arrow keys up and down)
- Are used to navigate through the menu and changes values for temperature and gas concentrations</td><td> </td></tr>
</table>

12.1 Activating the heat and gas controls

The heat and gas controls are activated using the heat ( ) button[2].

Soon after system activation the main display will alternate the reading between the following 3 parameters:

Tp	= Temperature in °C or °F (°C is default)
Co2.C	= CO_2 Concentration in %
O2.C	= O_2 Concentration in %

This is illustrated in the below table.

Action	Display
Tp = Temperature in °C or °F (default is °C)	
After 'tp' has been shown, the actual temperature will be displayed for a few seconds.	
Co2.C = CO_2 Concentration in %	
After 'CO2.C' has been shown, the actual CO_2 gas concentration will be displayed for a few seconds.	
O2.C = O_2 Concentration in %	
After 'O2.C' has been shown, the actual O_2 gas concentration will be displayed for a few seconds.	

If CO_2 regulation is deactivated the system will show 'OFF' right after 'CO2.C' has been displayed.

If O_2 regulator is deactivated the system will display 'OFF' right after 'O2.C' has been displayed.

[2] Activation of CO2 and O2 controls require that the CO_2 regulator 'CO2.r' and O_2 regulator 'O2.r' have been activated within the menu.

13 Keyboard Lock

In order to prevent any change of the settings by mistake, the G185 has a built in keyboard lock that can be activated/de-activated using the keyboard buttons.

Please follow the following instructions to lock and un-lock the keyboard.

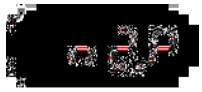
Action	Key
Press arrow up and arrow down along with the alarm key at the same time will lock the keyboard.	
When pressing a random key the display will show “lock”, while keyboard is locked.	
To unlock the keyboard press SP along with Arrow up and down keys at the same time.	

☛ *If the keyboard lock has been activated and any buttons is pressed ‘Lock’ will be shown on the display to indicate that the keyboard is locked.*

☛ *Kindly note that the alarm still can be muted when key lock is engaged.*

14 Alarms

When the G185 is in an alarm mode a message will be shown on the display. The below table contain a list of the alarm messages and an explanation of the alarms.

Alarm	Display
CO2 pressure alarm	
CO2 level alarm	
N2 pressure alarm	
O2 level alarm	

In the following chapters these alarm states are explained in more details.

14.1 CO_2 pressure alarm

If the CO_2 gas supply is not attached correctly or wrong CO_2 gas pressure is applied to the system, the G185 will go into CO_2 pressure alarm mode. “CO2.P” will be displayed, indicating wrong incoming gas pressure.

Action	Key	Display
CO_2 gas supply failure.		

☛ *‘P’ stands for pressure.*

A constant audible alarm is also activated which can be muted by pressing the alarm button .

☛ *By pressing the alarm button , the “CO2.P” message on the display will also disappear, but the red LED light will stay on until correct gas pressure is applied to unit.*

14.2 N_2 pressure alarm

If the N_2 gas supply is not attached correctly or wrong N_2 gas pressure is applied to the unit, the G185 will go into alarm mode.
“n2.P” will be displayed, indicating wrong incoming nitrogen gas pressure.

Action	Key	Display
The gas supply is not attached correctly or empty.		

☛ *‘P’ stands for pressure.*

A constant audible alarm is also activated which can be muted by pressing the alarm button .

☛ *By pressing the alarm button , the “N2.P” message on the display will disappear but the red LED light will stay ON until correct gas pressure is applied to unit.*

14.3 CO_2 level alarm

CO_2 level alarm is activated if the concentration of the CO_2 gas is deviating by than $\pm 1\%$ from set value.

Remember when changing the set point more than ±1% from the current gas level this will result in an CO_2 level alarm. The same goes for all calibration adjustments.

Action	Key	Display
Gas concentration is deviating by more than one percent from set value.		

☛ *When there is an alarm an acoustic signal is also activated which can be muted by pressing the alarm ( )button.*

14.4 O_2 level alarm

O2 level alarm is activated if the concentration of the O_2 gas is deviating by more than $\pm 1\%$ from set value.

Remember when changing the set point more than ±1% from the current gas level this will result in an CO_2 level alarm. The same goes for all calibration adjustments.

Action	Key	Display
O_2 gas concentration is deviating by more than one percent from set value.		

☛ *When there is an alarm an acoustic signal is also activated which can be muted by pressing the alarm ( )button.*

14.5 Temperature alarm

All zones of the heating system can trigger a temperature alarm if they are more than ±0.5 degree C from the set point.

Remember when changing the set point more than ±0.5 degrees from the current temperature this will result in an alarm. The same goes for all calibration adjustments.

The alarm condition is indicated by a red LED light in the alarm key and a pulsating audio signal that can be muted by pressing the alarm key once.

Action	Key	Display
To mute the alarm sound press once. Press once again and the sound will no longer be muted.		

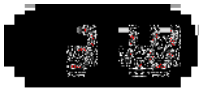
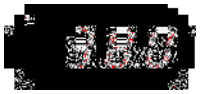
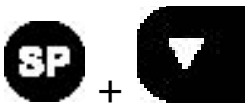
☛ *When there is a temperature alarm an acoustic signal is also activated which can be muted by pressing the alarm ( )button.*

☛ *The display will not change in any way and will stay at the point where it was when the alarm started.*

15 Setting the temperature

The set temperature is 37.0°C by default. The set temperature can be adjusted in the range from ambient to 49.0°C.

Changing the Set point for the temperature, follow these instructions:

Action	Key	Display
Press the button with the symbol SP, the current set temperature will be shown on the display.		
To raise the set temperature press and hold SP, then press arrow UP. When the desired Set-point is reached release both keys.		
To lower the Set-point temperature press and hold SP, then press arrow DOWN. When the desired set-point is reached, release both keys.		

☛ *If SP and arrow UP or DOWN are pressed continuously the temperature setting will change quickly. To change the temperature slowly, press one step at a time.*

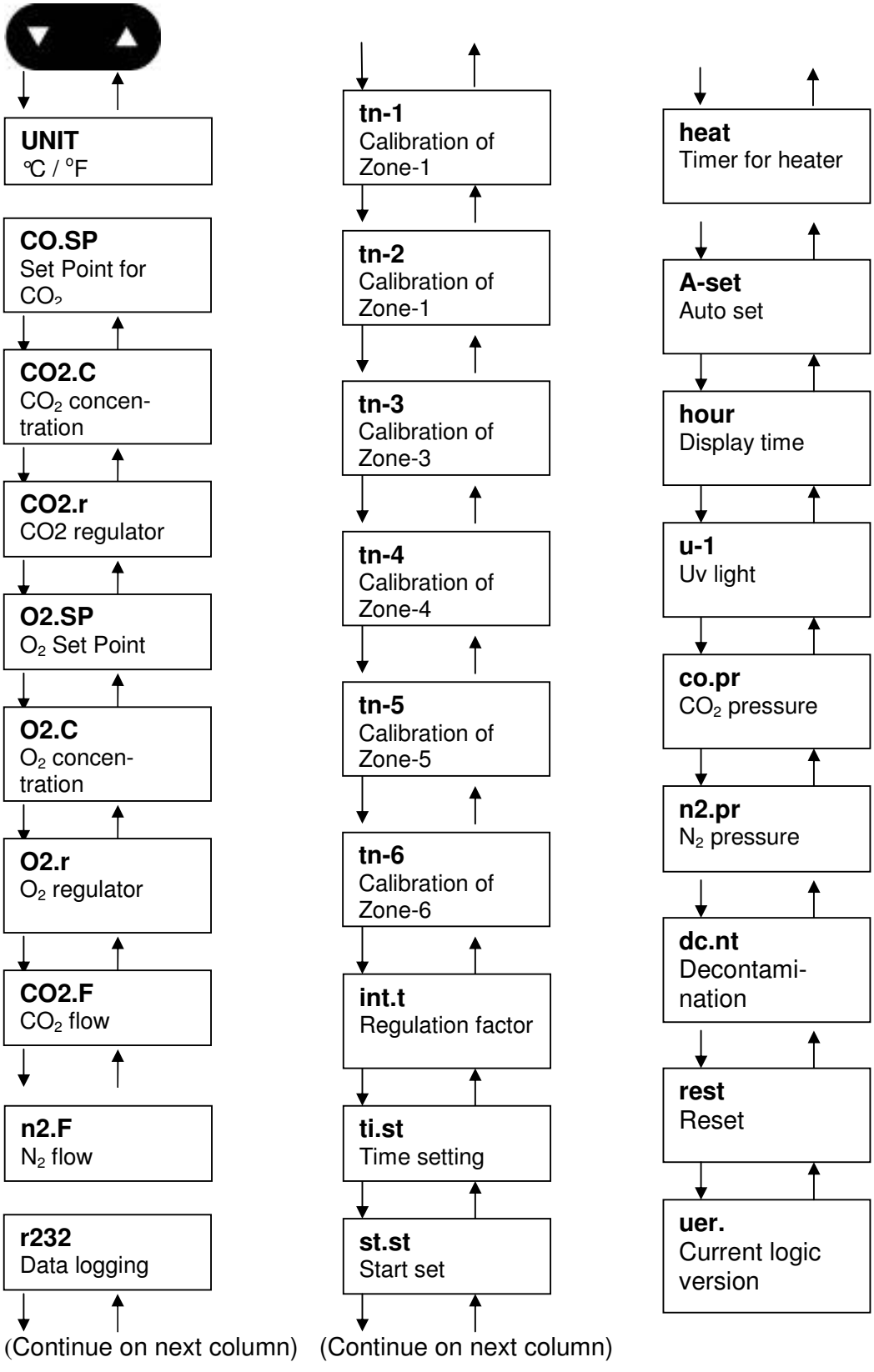
16 Menu Function

The user can access a number of advanced functions via the menu.

Please follow the below instructions for entering, exiting and navigating within the menu.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The first option “UNIT” will appear in the display.		
Press UP/DOWN key to navigate within the Menu.		
While holding the setpoint key in, press either the arrow UP or arrow DOWN key to change values within the options.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

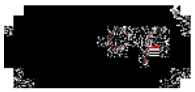
17 Overview of the menu items



17.1 Unit

In the UNIT option the **displayed temperature** can be set either to degrees **Celsius** or **Fahrenheit.** As default this is set to °C.

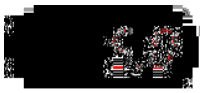
Follow these steps to navigate in the UNIT option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press and hold SP key to see if °C or °F is chosen.		
While holding the SP key in, press either the arrow UP or arrow DOWN key to toggle between Celsius (^{o}C) or Fahrenheith (^{o}F).		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

17.2 CO2 concentration Setpoint

'Co.SP' is the CO_2 set point. This option is used to change the desired CO_2 concentration in the system.

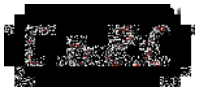
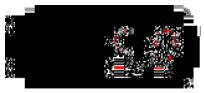
In order to change the CO_2 setpoint, please follow below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press arrow DOWN key until the option "Co.SP" appears in the display.		
Press and hold the SP key to see the current set value for CO_2 concentration.		
Change by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

☛ *As default the CO_2 setpoint (CO.SP) is set to 5.0 %.*

17.3 CO_2 concentration / calibration

Co2.C is the CO_2 calibration or a reading of the actual CO_2 concentration in the system.
Remember that the CO_2 regulator must be activated before the concentration can be viewed or changed.
Whenever an adjustment of the CO_2 concentration is needed it can be done here by following below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "Co2.C" appears in the display.		
Press and hold the SP key to have a reading of the current CO_2 volume.		
Use SP key and arrow UP or DOWN to adjust the reading based on reliable data from an external gas analyzer.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

☛ *Please refer to next chapter to for instructions on how to activate CO_2 regulator.*

☛ *Please refer to chapter 20 for more details on gas level validation and calibration procedures.*

☛ *Calibration is done by adjusting the CO_2 level according to a measurement done on the gas sampling outlet using a precision CO_2 measurement device only.*

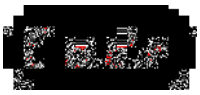
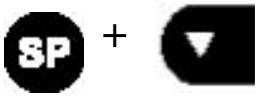
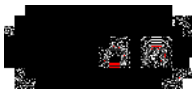
⚠ **Changing the calibration value should only be done based on certain measurement by a trained user or a technician.**

17.4 CO2 regulator

'CO2.r' is used to toggle the CO_2 regulation ON/OFF.

As default the CO_2 regulator is set to 'ON'.

Follow the below instructions to activate/deactivate the CO_2 regulator.

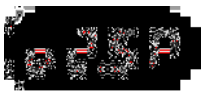
Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "Co2.r" appears in the display.		
If CO_2 regulation is not needed, it can be switched OFF here. The Default value is ON. CO_2 regulation is switched to OFF by holding the SP key while pressing the arrow DOWN key once.		
When the CO_2 regulation has been set for OFF there will not be shown any value under the 'CO2.C' menu point. It will display 'OFF' to indicate that the regulator has been deactivated by user.		
Press and hold UP+DOWN key for 3 seconds to exit the menu.		

☛ *Always connect 100 % pure CO_2 source to the CO_2 gas inlet located on the back of G185 before switching the regulator 'ON'.*

17.5 *Oxygen concentration setpoint*

"O2.SP" is the O_2 set point. This option is used to change the desired O_2 concentration in the system.

In order to change the O_2 setpoint, please follow below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "o2.SP" appears in the display.		
Press and hold the SP key to see the set value.		
Change by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

As default the O_2 setpoint (O2.SP) is set to 5.0%.

17.6 Oxygen Concentration / Calibration

The item called 'O2.C' is found in the menu and is used for calibration or just having a readout of the actual O_2 concentration in the system.

Remember that O_2 regulator must be activated before the concentration can be shown/changed.

Whenever an adjustment of the O_2 concentration is needed it can be done here by following below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "o2.C" appears in the display.		
Reading the actual O_2 value is done by pressing and holding the SP key.		
Change by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

Please refer to next chapter to for instructions on how to activate O_2 regulator.

Please refer to chapter 20 for more details on gas level validation and calibration procedures.

Calibration is done by adjusting the O_2 level according to a measurement done on the gas sampling outlet by a precision O_2 measurement device.

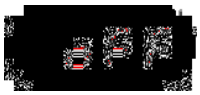
Changing the calibration value should only be done based on certain measurement by a trained user or a technician.

17.7 O2 regulator

'O2.r' is used to toggle the O_2 regulation ON/OFF. If O_2 regulation is not needed, the oxygen regulator can be switched off here.

If low oxygen conditions are needed the O_2 regulator must be switched to ON.

Follow the below instructions to activate/deactivate the O_2 regulator.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "o2.r" appears on the display.		
When the O_2 regulation has been set for "OFF" there will not be shown any value under the 'o2.C' menu point. It will display "OFF", to indicate that the regulator has been deactivated by user.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

Always connect a 100 % pure N_2 source to the gas inlet on the rear before switching the regulation ON.

The Default status for the oxygen control is OFF.

17.8 CO2 flow rate

"Co2.F" is the CO_2 gas consumption. It is automatically measured by the system and the actual consumption is shown.

In order to get a reading of current CO_2 gas consumption, please follow below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "Co2.F" appears in the display.		
Pressing and holding the SP key will give a reading of the actual flow rate.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

CO_2 gas consumption is not a fixed value and may change in the intervals from 0 l/h – 10 l/h.The necessary amount needed is automatically calculated and adjusted by the system.

Remember that 100% pure and dry CO_2 gas will bee needed to increase the CO_2 level in the system.

17.9 N2 flow rate

"n2.F" is the N_2 gas consumption. The necessary amount is automatically calculated and adjusted by the system and the actual consumption is then shown.

In order to get a reading of current N_2 gas consumption, please follow below instructions.

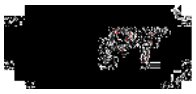
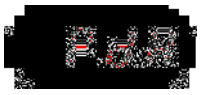
Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "n2.F" appears in the display.		
Pressing and holding the SP key will give a reading of the current nitrogen consumption.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

☛ *N_2 gas consumption is not a fixed value and may change in the intervals from 0 l/h – 54 l/h.The necessary amount is automatically calculated and adjusted by the system.*

☛ *Remember that 100% pure and dry N_2 will bee needed to reduce the O_2 level in the system. Remember also to activate the O_2 regulation as described in chapter 17.7.*

17.10 PC/PDA data logger

The next item in the menu is “r232”. This is the communication protocol with the PDA or a Windows based PC. The communication can be toggled between PC, PDA or OFF here.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “r323” appears in the display.		
Press key UP or DOWN once while holding the SP to turn on the communication port. Data logging is prepared and sent for a PC (default).		
When the required setting is set let go of the SP key.		
Hold the ‘SP’ button and press ‘down’ once, this will change the display reading to “PDA”. Now data are being prepared and send for a PDA attached to the G185.		
Hold the ‘SP’ button and press ‘down’ once more, this will change the display reading to “OFF”. No data is being sent to the communication port.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

Having the parameter set incorrectly when no PDA or PC is attached will not make any difference. Only switching to "OFF" when the PDA or PC is attached will impact on the datalogger software.

Communication protocol is set to 'PC' by default.

Please refer to the enclosed "Installation instruction for datalogger software" for further instruction for datalogger installation.

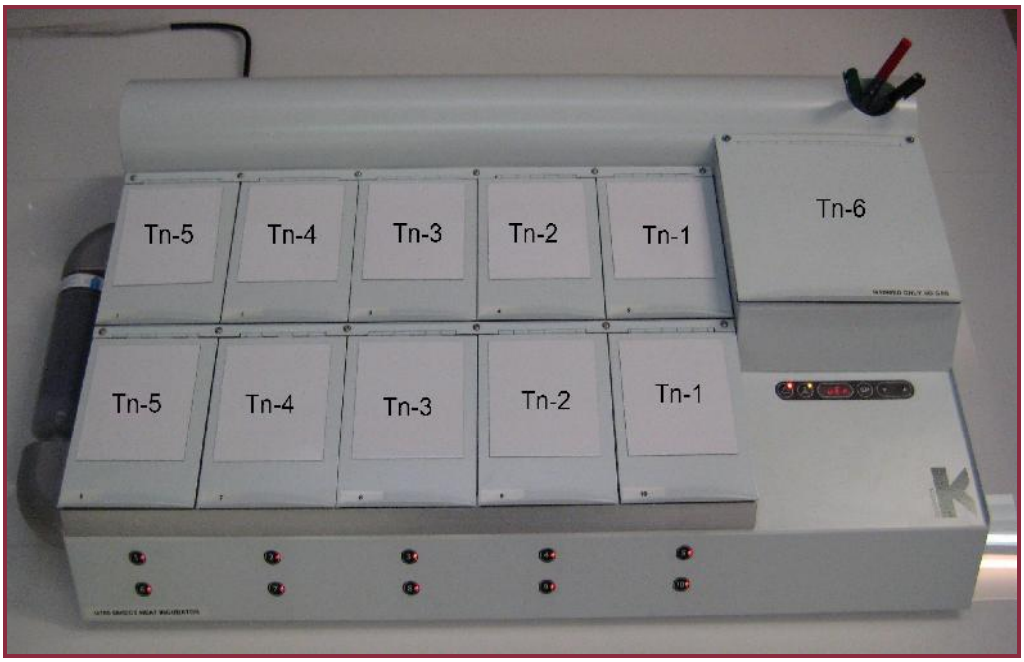
Never attempt to switch off the dataflow when the PDA or PC is logging data. Stop the program first on the PDA or the PC.

17.11 Surface Temperatures

In this section the temperature controls of the G185 is described.

There are 6 separate controls for the temperature on the G185.
Each controller is responsible in controlling the temperature of a separate zone.

Therefore each of the 6 available zones is equipped with its own separate temperature sensor and heater, allowing the user to adjust the temperature within every zone separately and achieve higher precision.



Each zone can be calibrated separately using the item that corresponds to the respective zone in the menu.

These items are placed in the menu and they are named: Tn-1, Tn-2, Tn-3, Tn-4, Tn-5 and Tn-6.

An overview of the zones associated with the tune functions is shown on table below.

Zone name	Chambers in zone
tn-1	Chamber no. 5 and 10
tn-2	Chamber no. 4 and 9
tn-3	Chamber no. 3 and 8
tn-4	Chamber no. 2 and 7
tn-5	Chamber no. 1 and 6
tn-6	Big compartment

From the table above we can see that compartment no. 5 and 10 is controlled by 'Tn-1'.
In order to adjust/calibrated the temperature of this zone please find item called 'tn-1' and adjust using high precision thermometer.

Calibration of temperature is done by adjusting the tn-x (where x is the zone number) according to a measurement done on both of the chambers within the zone by a precision Thermometer.

After temperature adjustment allow at least 15 minutes for the temperature to stabilized, use the thermometer to verify correct temperatures on each zone.

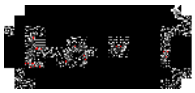
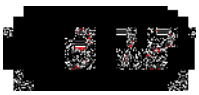
Be careful when changing the calibration settings to only change the tune value of the place where the measurement is actually done. Give the system time to adjust.

Remember that if one warmed area is much warmer than the area in its proximity there will be cross over heating. Calibration is best done by starting out with Tn-1 and then Tn-2 to Tn-6. Then letting the system stabilize and repeating the procedure.

Please refer to chapter 19 for a more detailed description of temperature validation.

17.11.1 Calibration of Zone 1

The item called “Tn-1” in the menu is used to calibrate the temperature in zone1.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-1” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 1 (chamber no. 5 and 10)		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

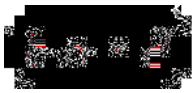
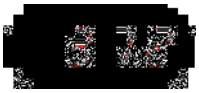
‘tn-1’ is used to adjust the temperature of compartment 5 and 10.

Adjust according to a high precision measurement done in a dish with media under mineral oil located in compartment 5 and 10.

Please refer to chapter 19 for a detailed description of temperature measurement on G185.

17.11.2 Calibration of Zone 2

The item called “Tn-2” in the menu is used to calibrate the temperature in the zone2.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-2” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 2 (chamber no. 4 and 9)		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

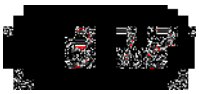
‘tn-2’ is used to adjust the temperature of compartment 4 and 9.

Adjust according to a high precision measurement done in a dish with media under mineral oil located in compartment 4 and 9.

Please refer to chapter 19 for a detailed description of temperature measurement on G185.

17.11.3 Calibration of Zone 3

The item called “Tn-3” in the menu is used to calibrate the temperature in the zone3.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-3” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 3 (chamber no. 3 and 8)		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

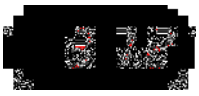
‘tn-3’ is used to adjust the temperature of compartment 3 and 8.

Adjust according to a high precision measurement done in a dish with media under mineral oil located in compartment 3 and 8.

Please refer to chapter 19 for a detailed description of temperature measurement on G185.

17.11.4 Calibration of Zone 4

The item called “Tn-4” in the menu is used to calibrate the temperature in the zone4.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-4” appears in the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 4 (chamber no. 2 and 7)		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

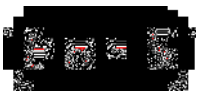
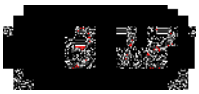
‘tn-4’ is used to adjust the temperature of compartment 2 and 7.

Adjust according to a high precision measurement done in a dish with media under mineral oil located in compartment 2 and 7.

Please refer to chapter 19 for a detailed description of temperature measurement on G185.

17.11.5 Calibration of Zone 5

The item called “Tn-5” in the menu is used to calibrate the temperature in the zone5.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-5” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 5 (chamber no. 1 and 6)		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

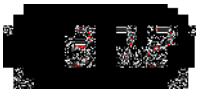
☛ *‘tn-4’ is used to adjust the temperature of compartment 1 and 6.*

☛ *Adjust according to a high precision measurement done in a dish with media under mineral oil located in compartment 1 and 6.*

Please refer to chapter 19 for a detailed description of temperature measurement on G185.

17.11.6 Calibration of Zone 6

The item called “Tn-6” in the menu is used to calibrate the large compartment used for dry bath incubation purposes.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-6” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 6 (Large compartment)		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

The large compartment is only warmed and has no gas control.

Please refer to chapter 19 for a detailed description of temperature measurement on G185.

17.12 Regulation factor

The INT.T (Integral Time) option is for changing the base value for the PID controller. This should not be attempted by unauthorised persons. If set at a different level the controlling principle will be affected.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “int.t” appears on the display.		
Pressing and holding the SP key will give a reading of the current setting.		
The value for regulation factor can be change using SP key along with arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

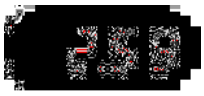
From the factory it is set to a closely calculated value specific for the model.

Do not change the value here unless authorization has been given directly by K-SYSTEMS.

17.13 Timer setting

The “ti.St” refers to the timer functions, which means *time set*.

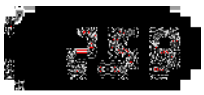
Follow these steps to navigate in the “Ti.St” option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “Ti.St.” appears on the display.		
Press and hold SP key to change values.		
Change the hour 0-24 by pressing and holding the SP key and then changing the hours with the arrow down key.		
Change the minutes from 00-59 in a similar way but this time using the arrow up key.		
When the time is set correctly leave this menu point by letting go of the SP key and pressing the arrow up and down.		

17.14 St.St

The next menu point is “St.St”. This means *Start Set* and is where timer function is set to switch ON for the G185.

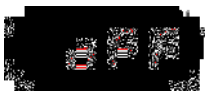
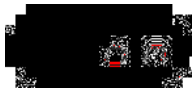
Follow these steps to navigate in the St.St. option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “St.St.” appears in the display.		
Press and hold SP key to change values.		
Change the hours 0-24 by pressing and holding the SP key and then pressing arrow down key.		
Change the minutes from 00-59 in a similar way but this time using the arrow up key.		
When the time is set correctly leave this menu point by letting go of the SP key and pressing the arrow down.		

17.15 Heat

When the start time has been set the next menu item “heat” must be switched to “ON” if the warmed area should warm up.

Follow these steps to navigate in the HEAT option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “hEAt.” appears in the display.		
Press and hold SP key to change values.		
While holding the SP key in, press the arrow UP to select between “ON” or “OFF”. When the required setting is activated, let go of the SP key.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

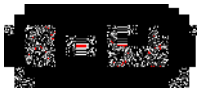
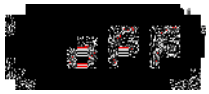
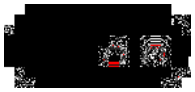
☛ *If the Heat is set to off when the timer function is set nothing will be switched on when the timer engages.*

☛ *Make sure that all compartments are empty when the timer function is used.*

17.16 A-St

The A-St (Automatic Start) option is used to **repeat the timer** (St.St.) function **everyday of the week.**

Follow these steps to navigate in the A-St option.

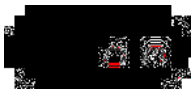
Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “A-St.” appears in the display.		
Press and hold SP key to change values.		
While holding the SP key in, press the arrow UP to toggle between “ON” or “OFF”. When the required setting is activated, let go of the SP and arrow keys.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

Penultimate menu point for the timer function is “A-St”. This function will activate the timer all days if toggled to ON and the time + start time has been set accordingly.

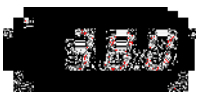
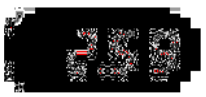
☛ *Remember there are no calendar functions in the timer, so all days include Saturday and Sunday.*

17.17 Hour

The HOUR option gives the opportunity to **show the time** on the display when the **heat is off.**
Follow these steps to navigate in the HOUR option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “HOUR” appears in the display.		
Press and hold SP key to change values.		
While holding the SP key in, press either the arrow UP or arrow DOWN key to select between “ON” o´r “OFF”. When the required setting is activated, let go of the SP key.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

It is also possible to toggle between the temperature display and the clock by pressing SP and heat ( ). Remember to press SP first as you otherwise will switch off the unit.

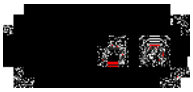
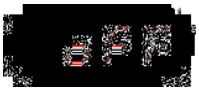
Action	Key	Display
Press and hold SP key.		
While holding the “SP” key in, press the HEAT key once, then let go of the “SP” key. The display now shows the time.		

17.18 UV light

The next item in the menu is “u1”. This is the toggle ON/OFF for the UV-light inside the circuit. The UV light will make sure that no contamination occurs in the circuit. When correctly set up there is full Carbon filtering of the air so that any harmful by product from the UV light process is removed at all times.

If the UV light is not needed it can be switched off from the menu.

Please follow below instruction on how to switch ON or OFF for the integrated UV light.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “u1” appears in the display.		
Press and hold SP key to see actual status.		
Press and hold SP while pressing arrow DOWN once to change status of UV light.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

The UV light will automatically switch off when the unit is turned off.

☛ *For optimal air purification reasons it is recommended to have the UV light set to ON when unit is being used.*

17.19 Pressure of incoming CO_2 gas

The next item in the menu is “Co.Pr” and stands for *CO_2 pressure*. This function can only be used to monitor the CO_2 gas pressure inside the unit.

In order to check the internal CO_2 gas pressure please follow these instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “Co.Pr” appears in the display.		
Press and hold SP key to monitor internal CO_2 gas pressure.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

The actual CO_2 gas pressure in the circuit is shown (normally between 0.35 – 0.65).

☛ *Remember that the inside pressure is always lower than what is shown on the outside regulator on the gas bottle. This is because there is a built in pressure limiter in the circuit.*

17.20 Pressure of incoming N_2 gas

The next item in the menu is n2.Pr and stands for *N_2 pressure*. This function can only be used to monitor the N_2 gas pressure inside the unit.

In order to check the internal N_2 gas pressure please follow these instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “n2.Pr” appears in the display.		
Press and hold SP key to check the actual N_2 gas pressure (normally between 0.35 – 0.65).		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

By pressing the ‘SP’ button the actual N_2 gas pressure is shown (normally between 0.35 – 0.65).

☛ *Remember that the inside pressure is always lower than what is shown on the outside regulator on the gas bottle. This is because there is a built in pressure limiter in the circuit.*

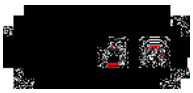
17.21 Decontamination

The next item in the menu is “dCnt” which stands for *decontamination*. This function enables the user to heat up the whole heated area (zone 1 to zone 6) up to 60°C for approx. 1 hour in order to decontaminate the whole heated surface.

The decontamination system is equipped with a timer that automatically stops the decontamination process when the desired temperature has been reached and brings the system back to normal status.

WHILE DECONTAMINATION PROCESS IS ACTIVE, ALL GAS REGULATIONS ARE DEACTIVATED. AN ACOUSTIC ALARM WILL WARN THE USER ABOUT RISING TEMPERATURES. THE ACTUAL TEMPERATURE AND DECOMINATION TIME LEFT WILL BE CONSTANTLY BEE SHOWN ON THE DISPLAY. THE SYSTEM WILL ALSO WARN THE USER ABOUT THE HOT SURFACE TEMPERATURES.

To activate the decontamination process, please follow the instructions below.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “dCnt” appears in the display.		
Hold the SP button while pressing arrow UP or DOWN buttons to toggle the decontamination OFF or bring it back ON again.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

AFTER END DECONTAMINATION PROCESS THE UNIT WILL STILL BE HOT. DO NOT USE THE DEVICE UNTIL THE TEMPERATURE AND GAS LEVELS ARE BACK TO NORMAL. IT IS RECOMMENDED TO TEST THE TEMPERATURE AND GAS CONCENTRATIONS BEFORE USE TO ENSURE CORRECT LEVELS.

17.22 Reset

Next item in the menu is the function “REST”. This is the overall back to factory default settings function.

To restore factory settings please follow the instruction below.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “REST” appears in the display.		
Press and hold SP key to change values.		
While holding the SP key in, press either the arrow UP or arrow DOWN key. When the display shows “----“,* let go of the “SP” key.		
Press and hold UP+DOWN keys for 3 seconds again to exit the menu.		

A complete restore will be done.

17.23 Logic firmware

The logics installed on your G185 is upgradeable. Whenever an important update is available it will be distributed to our distributers around the world who will make sure that your incubator runs with the newest available logic firmware.

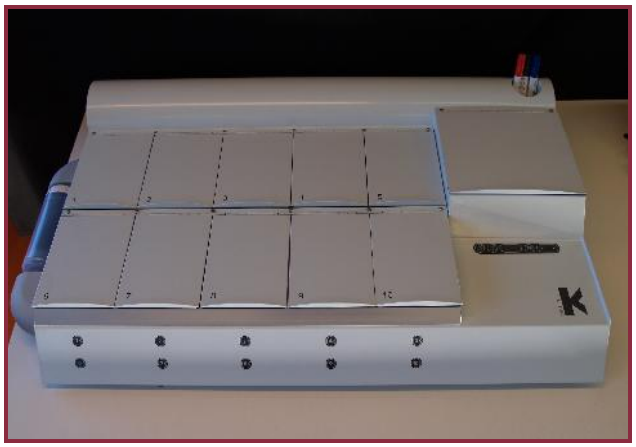
Please follow these steps to check the logic firmware which is currently installed on your unit.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “uEr” appears in the display.		
Press and hold SP key to check the unit’s current firmware version.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

18 Front chamber keys

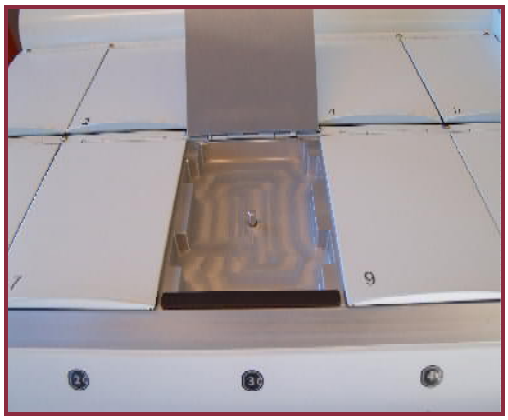
On the sloping front of the G185 there are 10 buttons located. They are numbered from 1 to 10. Each button corresponds to one compartment.

The compartments will be labelled to show which specific compartment corresponds to which button. Should the labels have been removed the order is also listed below:



Pressing a key will toggle the light in the key on/off. This light can be used as an indication/warning that the compartment is in use and should not be opened.

Never leave a compartment lid open for unnecessary long time. Each opening should be minimized to less than 10 seconds under normal use.



Inside the compartment there is a warmed area that covers the bottom. In the middle the gas intake and outlet is located. This must be kept free at all times.

If the gas inlet/outlet in the middle of each compartment is blocked the gas concentration in that compartment will no longer be correct.

The area in each chamber can be cleaned with a suitable cleaning detergent. If alcohol or a similar embryo harmful substance is used make sure that the lid is kept open for some hours afterwards or rinse with sterile water so that all traces are removed before use.

The gas in/outlet of the compartment is shown in detail.

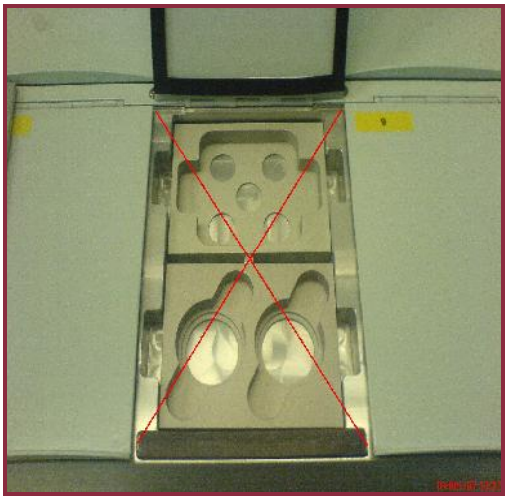
Insert the warming optimization plate. The warming optimization plate will ensure full contact with the dish. This generally means much more stabile temperature for the cells.

The plate fits the compartment. The plate can be taken out and put in an autoclave for cleaning.

Place the dish where it fits the pattern. There is a warming optimization plate for Nunc and for Falcon dishes. The plate is marked with a “N” on the reverse side for Nunc and “F” for Falcon type dishes.

A little mineral oil inside the groove will make it easier to remove the dish.

The K-SYSTEMS warming blocks for the G85 is not recommended for use in the G185.



19 Temperature validation

The temperature of each of the 6 zones can be validated using the following equipment:
In order to be able to perform the temperature test the following items are needed:

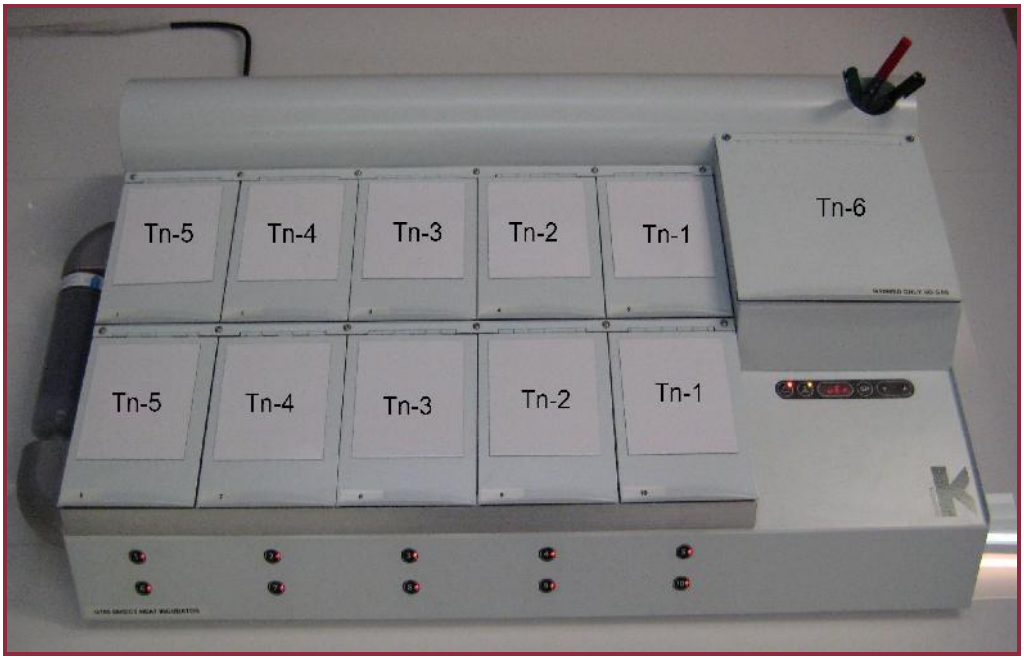
- Precision thermometer

- Falcon® or Nunc® dish with integrated PT-100 sensor mounted in the dish.

- Oil based Liquid

- Test Lid

There are 6 different regulators on board a G185; 5 regulators for controlling the surface temperature of the chambers (tn-1 – tn-5) and 1 controller for the big compartment (tn-6).



Within every zone there are 2 chambers. In order to be able to make an accurate temperature validation, it is strongly recommended to measure the temperature on both of the chambers whiting the specific zone. eg. To validate the temperature of tn-1 (the temperature of chamber no. 5 and chamber 10 must be measured, and an average value calculated.

The below table is used to localize the chambers associated with the specific zones:

Zone name	Chambers in zone
tn-1	Chamber no. 5 and 10
tn-2	Chamber no. 4 and 9
tn-3	Chamber no. 3 and 8
tn-4	Chamber no. 2 and 7
tn-5	Chamber no. 1 and 6
tn-6	Big compartment

Please follow these steps for a detailed instruction of how to validate/calibrate the temperature within each zone.

1: Place warming plate in all 10 chambers.

2: Switch on the incubator and wait for at least 40 minutes for the temperature to stabilize at set (eg. 37.0 degrees).

3: Open lid no. 10 (tn-1) and place the dish containing oil based liquid and temperature sensor inside.

4: Place test Lid and pull the sensor wire through the hole on the test Lid.

Wait for the temperature to get stabilized.
When temperature is stabilized write down the value and move on to the next chamber within the same zone.

5: When the temperature of both of chambers within the same zone has been measured, the average value must be calculated using the following formula:

$$Temp_avr_{tn-x} = \frac{Temp1_{tn-x} + Temp2_{tn-x}}{2},$$

- where 'x' is the number of zone

6: Go through step 3 and 5 and calculate the average temperature value for all 6 zones.

When all 6 values are calculated, they should be compared with what is being shown by the system. This is done by entering the menu and checking the values for 'tn-1' to 'tn-6'. Adjust if the calculated value are different then the ones displayed by the system for each zone.

Extreme care must be taken here, as any wrong changes or adjustments will have a direct affect on the surface temperature of the Incubator.

20 Gas level validation

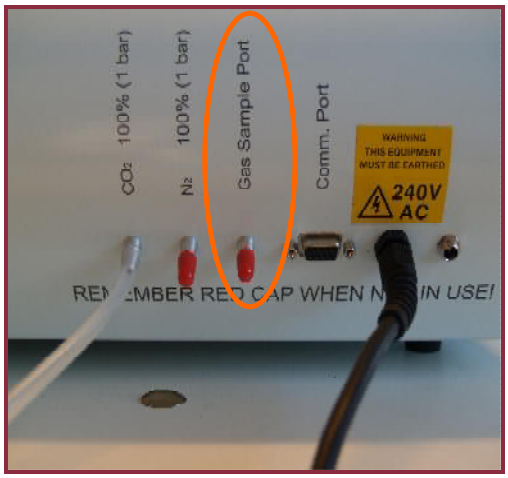
The gas level can be validated through the gas sample port on the backside of the G185 or directly from each chamber using the test Lid.

20.1 Gas level validation through gas sample port

The gas level can be validated through the gas sample port located on the back side of the Incubator.

☛ *Make sure that the Incubator is ON and the gas levels are stabilized before any gas measuring.*

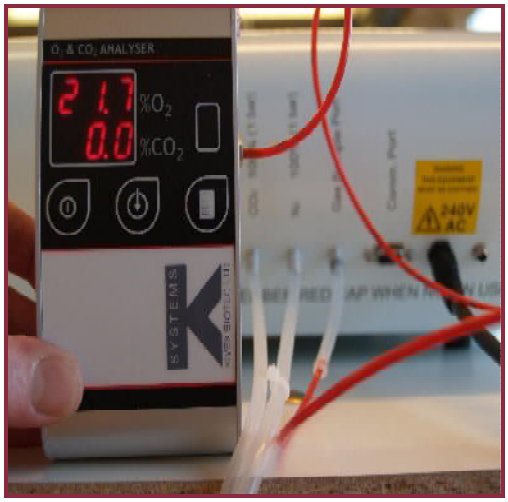
Remove the red Cap from the gas sample port and attach your gas analyzer to this port. Make sure that there are no leaks on any tubing's.



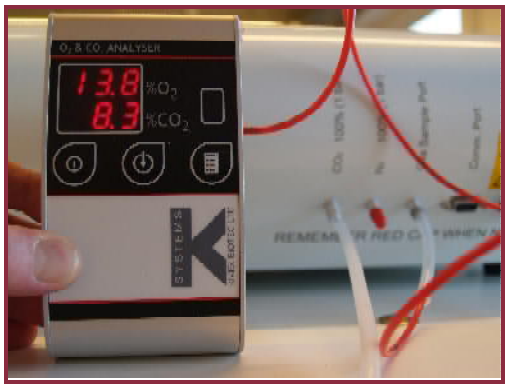
NEVER ATTACH A PRESSURIZED GAS SOURCE OR ANYTHING ELSE THAT BLOWS INTO THE SYSTEM ON THE GAS SAMPLE PORT.

Taking out large sample volume may affect the gas regulation.

Remove the red protective cap (hold carefully on to it). Attach the end of tube of the gas measuring probe into the gas sample port. Make sure that outside air is not drawn in.



The first measurement taken will be invalid as this is only the air inside the gas sample circuit that is being emptied.



Compare the CO_2 readout with the value shown under ‘CO2.C’ in the menu and adjust if necessary.

Please refer to chapter 17.3 for more instructions

Compare the N_2 readout with the value shown under ‘O2.C’ in the menu and adjust if necessary.

Please refer to chapter 17.6 for more instructions

Remember to put the protective red cap on the outlet afterwards.

20.2 Gas level validation through each gas chamber

The gas level can also be validated by taking a small gas sample from each of the chambers.

K-SYSTEMS strongly recommend the use of K-SYSTEMS gas analyzer as this unit is specially developed to take samples from small size chambers without interfering the internal gas conditions within each chamber.

Make sure that the Incubator is ON and the gas levels are stabilized before any gas measuring.

Prior to any gas measuring make sure that the Lid have not been opened for at least 5 minutes.

Make sure that the gas analyzer is calibrated before use.

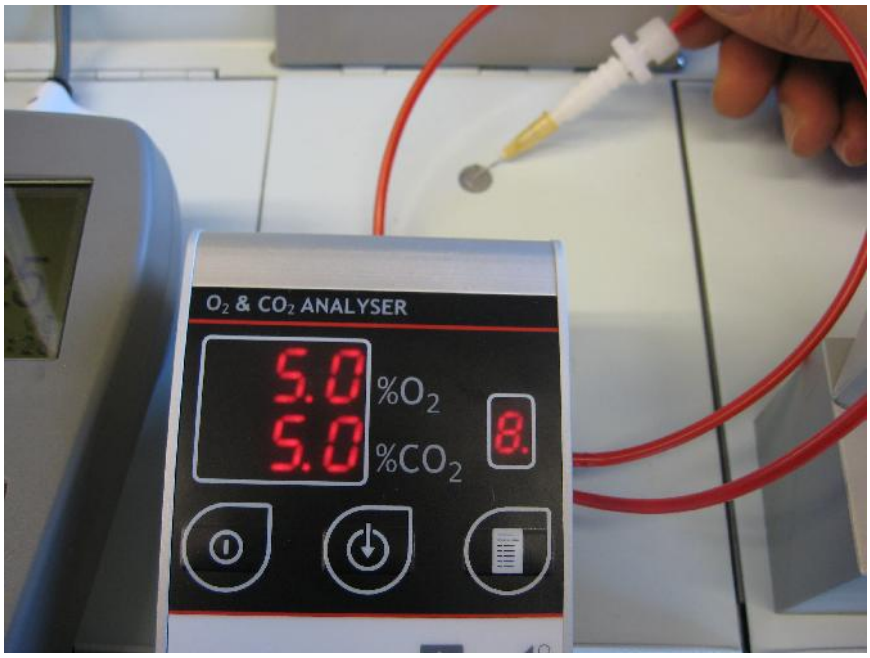
Please follow these instructions for gas measuring directly from each chamber.

1: Make sure that the system is ON, and that the gas levels are reached and stabilized.

2: Make sure that no Lids are opened through the whole validation process.

3: Inject the needle from the gas analyzer through the chamber and make a gas measurement.

4: Test Lid can also be used for customers using other types of gas analyzers.



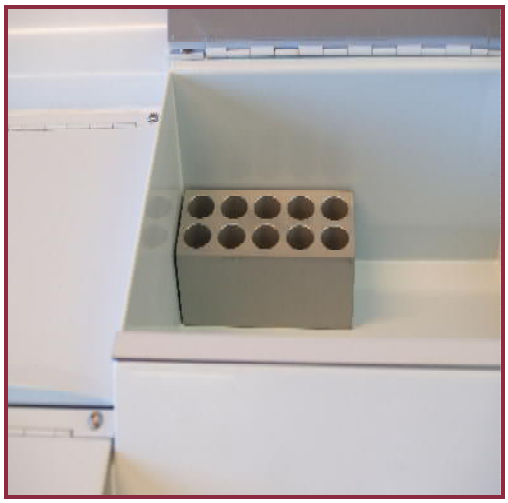
Compare the CO_2 readout with the value shown under 'CO2.C' in the menu and adjust if necessary.

Please refer to chapter 17.3 for more instructions

Compare the N_2 readout with the value shown under 'O2.C' in the menu and adjust if necessary.

Please refer to chapter 17.6 for more instructions

Remember to put the protective red cap on the outlet afterwards.



There is no gas control in the big compartment so all bottles kept in this compartment should be sealed or not be sensitive to CO2 or O2 levels.

21 AC cooling fan

The cooling fan is placed on the button cover of the G185 and is used to cool down the electronics inside.

The ventilation holes under the G185 must be kept clear at all times.

22 Alarm switch for external dialling system

In order to be able to connect the G185 to an external monitoring system, for maximum safety especially during the nights and weekends this Incubator is equipped with an external connector, a 2.5mm jack connector in the back, which can be connected to such a monitoring device.

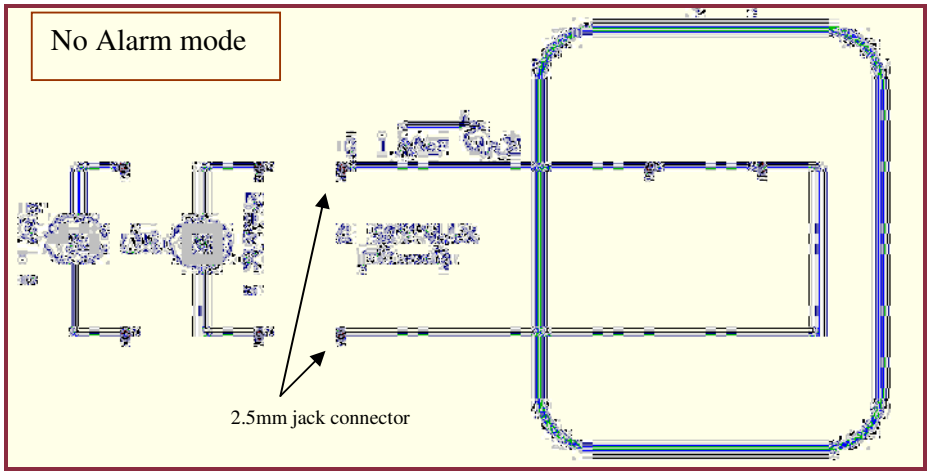
Whenever there is an alarm (that could be temperature alarm, out of set point gas alarms for CO_2 or O_2 levels, low pressure alarms for CO_2 and N_2 gases, no gas alarms or if the power to the unit suddenly is cut) the switch is de-activated indicating that the unit needs inspection by a user.

The connector can either get connected to a voltage source OR to a current source.

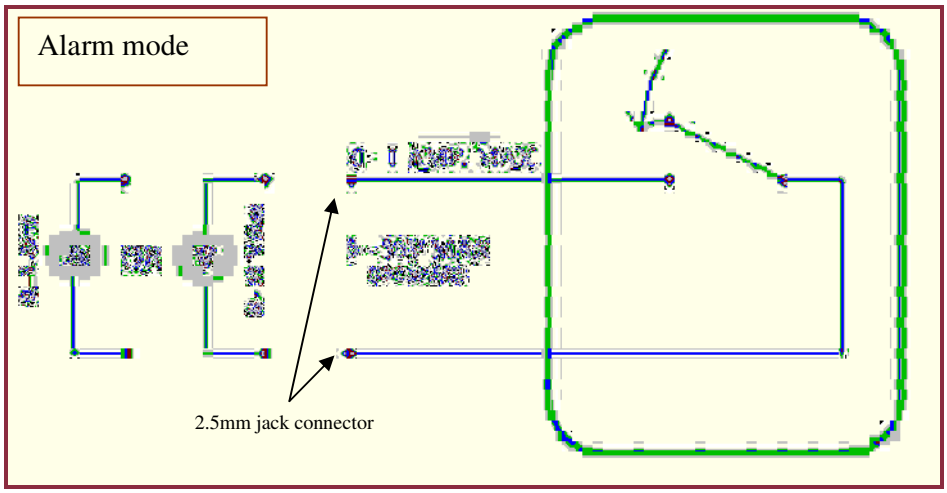
Note that if a current source is attached to the 2.5mm jack connector the maximum current rating is between 0 – 1.0 Amp.

If a voltage source is attached then the limitation is between 0 – 50V AC or DC.

If there is no alarm, the switch within the unit will be in 'ON' position as it is illustrated below.



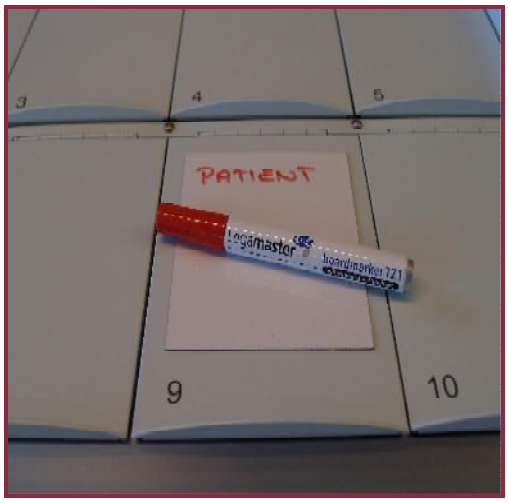
Whenever the G185 goes into an alarm mode the switch will become an 'open circuit'. This means that no current is able to run through the system anymore.



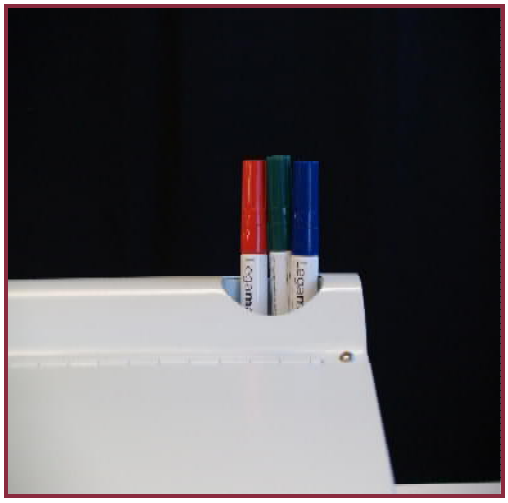
☛ *Whenever the incubator power cord is removed from power outlet in the wall this switch will automatically indicate an alarm! This is an extra safety feature added to alert the personnel in case of power cut out to the laboratory.*

23 Writing pads for the compartment lids and penholder.

Magnetic writing pads can be put on each compartment lids so that patient data or content of the compartment be written down. Only write with a suitable non toxic pen that allows the text to be removed afterwards.



There is a pen holder located on the right hand side of the G185.



24 Maintenance

Reliable and safe operation of this equipment is based on the following conditions:

1: Correct calibration of temperature and gas using high precision equipments in the intervals described in the manuals.

2: Replacement of VOC and inline HEPA filters in the correct intervals specified in the manuals.

3: Inspection and replacement of UV light according to the intervals defined in the manuals.

4: Replacement of Oxygen sensor in the correct intervals defined in the manuals.

It is strongly recommended to perform the inspection and servicing in the intervals described in the MAINTENANCE and SERVICING manuals. Refusing to do so can have fatal outcome causing the unit to stop performing as expected and cause damage to Embryos, Blastocysts etc. that are being kept alive inside the incubator.

Guarantee void if service and maintenance are not followed.

25 Troubleshooting

Heating system

Symptom	Cause	Action
No heating, display is off.	The heating switch is off.	Press the heating switch.
No heating.	The alarm is on.	The temperature is more than 0.5°C off the set temperature.
	The set point for temperature is wrong.	Check the desired temperature set point.
Heating not even.	System not calibrated.	Calibrate each zone according to the user manual using high precision thermometer.

CO_2 gas regulator

Symptom	Cause	Action
No CO_2 gas regulation.	System not powered	Check mains.
	System is on standby or switched off.	Switch the system on.
	CO_2 gas regulator is OFF	Activate CO_2 gas regulator by setting 'CO2.r' to ON in menu.
	No CO_2 or wrong gas attached to CO_2 gas input.	Check gas supply, make sure that 1.0 bar of gas pressure is applied.
	Actual gas concentration is higher than set point.	Check CO_2 set point at 'CO.SP' in the menu.
Poor CO_2 gas regulation.	Lid(s) are left open	Close lid(s)
	Insulation missing on lid(s)	Check the grey insulation on every lid.
'CO2.L' is shown on display.	CO_2 gas concentration more than $\pm 1\%$ from set point.	Allow system to stabilize by closing all lids.
'CO.Pr' is shown on display.	No/wrong CO_2 gas pressure to system.	Check CO_2 gas supply; make sure that pressure is kept stable at 1.0 bar.

O_2 gas regulator

Symptom	Cause	Action
No O_2 gas regulation	System not powered	Check mains.
	System is on standby or switched off.	Switch the system on.
	O_2 gas regulator is OFF	Activate O_2 gas regulator by setting 'O2.r' to ON in the menu.
	No N_2 or wrong gas type attached to N_2 gas input.	Check gas supply; make sure that 1.0 bar of N_2 gas is applied.
	Actual gas concentration is higher than set point.	Check O_2 set point at 'O2.SP' in the menu.
Poor O_2 gas regulation	Lid(s) are left open	Close lid(s)
	Insulation missing on lid(s)	Check the grey insulation on every lid.
'O2.L' is shown on display.	O_2 gas concentration more than $\pm 1\%$ from set point.	Allow system to stabilize by closing all lids.
'n2.Pr' is shown on display.	No/wrong N_2 gas pressure to system.	Check N_2 gas supply, make sure that pressure is stable at 1.0 bar. If O_2 regulation is not needed set the 'O2.r' to OFF in the menu to deactivate oxygen regulation and abort the N_2 alarm.

Data logger

Symptom	Cause	Action
No data is send to PC	System not powered	Check mains.
	System is on standby or switched off.	Switch the system on.
	The 'rs232' item in menu is set to 'OFF' or 'PDA' mode.	Change to 'PC'.
	Data cable between Incubator and PC not properly attached.	Check connection. Only use the cable supplied along with unit.
	Data logger software/USB driver not properly installed.	Please refer to software installation guide for instructions.

Display

Symptom	Cause	Action
Missing segment(s) in display.	Failure in the PCB	Replace the PCB. Contact your K-SYSTEMS Distributor for details.

Keyboard

Symptom	Cause	Action
Absent or erratic function of operation buttons.	Failure in the keyboard.	Replace keyboard. Contact your K-SYSTEMS Distributor for details.

26 Technical assistance

For more information, contact the K-SYSTEMS office nearest you. For Denmark, call **+45 45995600.** Outside Denmark, see your K-SYSTEMS catalogue for the phone number of the office nearest you or visit our website at www.K-SYSTEMS.dk for up to date world wide contact information.

K-SYSTEMS is pleased to provide internet access to product information for its products. To obtain user guides and any other documents that may associate with this product, please go to the K-SYSTEMS website at http://www.K-SYSTEMS.dk/214-products.htm.

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